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From: Mark Lane [mailto:[MarkLane@lafayetteinstrument.com](mailto:MarkLane@lafayetteinstrument.com)]  
Sent: Friday, January 26, 2007 10:49 AM  
To: [REDACTED]  
Cc: Chris Fausett; Roger McClellan  
Subject: Lafayette Polygraph Update

Gentlemen,

During the past week we have devoted our entire engineering efforts to resolving and better understanding the issues related to the scoring of the manual vs. automatic EDA measurement. While some charts appear to have minor differences between the manual and automatic modes, we certainly agree that this is an issue that needs to be resolved. We are also extremely confident that the issue can be resolved with changes to our automatic filter calculations.

We have broken down each component of the signal as it is passed from the hardware to the software and are in the process of reviewing the impact of each individual mathematical calculation that is performed on the data. The hardware provides the manual data and that unfiltered data is what is directly displayed in the manual mode. The automatic data is passed through a high-pass filter to remove the majority of the baseline shifts before being displayed. The calculations for the automatic filter are being thoroughly dissected. In addition to evaluating the current automatic filter method we are also reviewing alternative approaches. In order to retain the relative magnitude of the responses in automatic mode, a better baseline wander removal algorithm is required. We believe it needs to be adaptive to handle the various scenarios that are possible. We are in the process of developing and testing three different approaches. These include adaptive trend removal, adaptive high-pass filter, and adaptive pulse matched filter. The final solution may incorporate one of these filters or a combination of each.

In addition to our own engineering staff evaluating the automatic filter characteristics, we are working with outside engineers with extensive experience in digital signal processing and biomedical engineering. While no type of automatic filter will cause the traces to appear identical, we expect to have a complete software solution to the differences in scoring manual and automatic data within the next 4 weeks. At that time, we would like to ask for your assistance in evaluating the updated automatic filter. Any additional charts that you can provide that show the scoring differences or other characteristics will greatly assist us in thoroughly evaluating the changes to the automatic filter. Our primary concern before we implement the updated automatic filter is ensuring that a new problem or issue is not introduced.

In conclusion, we would like to thank you for bringing this issue to our attention and sincerely apologize that this issue has not been resolved sooner. While the above information is in regards to our efforts to resolve the automatic vs. manual scoring differences, we have other engineers and consultants reviewing the plunging EDA issue in the manual mode and the USB disconnection issue due to static discharge. The attached document references the current status of these other issues. If there are any questions, please contact us at any time.

Sincerely,

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